Pilates for Cauda Equina Syndrome Rehabilitation

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Abstract

Cauda Equina Syndrome (CES) is a severe condition which is commonly misdiagnosed and even when adequately treated, can have life lasting effects on the body. These effects can include horrific back and leg pain, loss of movement and/or sensation in the lower extremities and issues with bowel and bladder control. When a new client came to me after years of battling CES and low back pain, I was compelled to research her condition and develop a rehabilitation program to improve her comfort and daily life. This client had already been in Physical Therapy and was aware of her body's exercise restrictions. Based on my research, I was able to develop a safe Pilates program for this client using the BASI Block System which has dramatically improved her strength and overall well-being.
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Anatomical Description

The spinal cord begins at the base of the brain and continues down through the cervical and thoracic vertebrae. The name Cauda Equina (meaning "horse's tail" in Latin) refers to the bundle of nerve roots that extend beyond the end of the spinal cord in the upper lumbar vertebrae. These nerve roots are contained within the dural sac and are suspended in spinal fluid.

When the Cauda Equina becomes severely compressed, the nerves that communicate with the lower limbs and pelvic region cannot correctly send signals to those crucial areas. This interrupted or disrupted communication causes all sorts of problems ranging from horrific pain to incontinence – this is called Cauda Equina Syndrome (CES). The most common cause of CES is
a central disk herniation in the lumbar area of the spine that compresses more than one of the nerve roots (as shown below). Some other causes of CES include stenosis, tumors or lesions, infections or traumatic injuries.

In the diagram below there is a healthy & "normal" view of a lumbar vertebra with the spinal nerve root or Cauda Equina without any compression or issues. Below the "normal" shows how leg dominant pain (sciatica) presents in the lumbar vertebra. Notice the herniation is only on one side, affecting just a spinal nerve. The third image (to the right) displays a picture of what is occurs with Cauda Equina Syndrome in the lumbar vertebra. The central prolapse of the disc is compressing the sac of nerve roots.
Introduction

Recovery and rehabilitation for CES are dependent on many factors including what the original cause of the syndrome was, what treatments or surgeries were done, symptoms the client experienced, age, fitness level and their natural ability to heal. The center of the rehabilitation program is the lumbar spine. My program primarily focused on stretching and strengthening the muscles that support the spine – the extensors, the flexors and the obliques. The pelvic floor muscles, as well as the transverse abdominis, are also very essential to the healing process and recovery program as they play a crucial role in posture and in supporting the low back. In the pages to follow, I will review my case study and the rehabilitation Pilates program that I designed for the client.
Nancy is a recently retired 65-year old who is very active and an avid hiker. She hikes 5-6 miles on average six days a week as well as a strength-training regime at the gym a few times a week. Nancy presented with Cauda Equina Syndrome (CES) which limits the types of exercises she can safely perform. The injury occurred eight years ago when she was water skiing. As the boat pulled her forward out of the water on her single ski, she suddenly felt a tremendous amount of pain rush through her back. She had already been experiencing some low back pain, and doctors aren't quite sure what happened during this occasion to cause the CES. Since the accident and her initial treatment, Nancy had been going to physical therapy on and off for her low back pain and instability. After a flare-up at the beginning of 2017, she began a regular physical therapy routine. Her physical therapist recommended she start incorporating Pilates into her weekly exercise program to strengthen her core to increase her back stability to protect her L2-L5 that had been damaged during that initial water skiing incident. Due to the severity of her injury and the location in her spine, she was advised by her doctor and physical therapist to refrain from any forward flexion or spinal articulation. In addition to strengthening her low back and core, other goals for our sessions were to increase the flexibility and strength in her hips and legs and work on her balance. Other than her CES diagnosis, Nancy presented as a very healthy 65-year old and was ready to be challenged with Pilates.
Conditioning Program

Over the course of XXX months, Nancy joined me for Pilates sessions two times a week, and I rotated what equipment she used from session to session. Below are two examples of programs that I implemented with her. Sometimes not all of the blocks were met due to time constraints as we move at a slower pace for safety reasons. Occasionally parts of one program were switched with the corresponding block exercises in the other program due to flow or how the client was feeling that day. Her program focused on building core strength, hip extensor strength, balance and stretching while working with her physical limitations and most importantly, keeping her safe from further injury.

The warm-up included some of the BASI fundamental warm-up but omits the chest lift and chest lift with rotation because forward flexion was not recommended by her physician. Instead, the warm up focused on strengthening hip flexors and hamstrings along with the abdominals and allowed for some stretching through those areas with the leg circles (with use of the TheraBand).

Footwork was either done on the reformer or Wunda Chair as they both offer significant benefits for Nancy. The weight was kept light as Nancy is still building her strength and I wanted to avoid any overcompensation that may occur in the low back with more substantial springs. I particularly favored the foot work on the Wunda Chair for Nancy because of the focus on pelvic lumbar stability.

Most of the Pilates abdominal repertoire includes forward flexion, which was not a safe option for Nancy. However, omitting specific exercises like round back from the Short Box Series gives Nancy the opportunity to focus on her abdominal strength and trunk stabilization. On the Cadillac, the focus of the modified bottom lift with roll up bar is trunk stabilization.

Hip work was also a very crucial part of Nancy's Pilates program as building hip extensor strength, and pelvic lumbar stability will significantly aid her rehabilitation. The reformer provided more
support for the hip work and the ability to keep the movements more controlled with the feet in straps. However, hip work on the Cadillac allowed for more challenge and with the single leg supine series, the opportunity to strengthen each side independently.

Nancy's physical therapist highly recommended bridging type exercises (specifically without spinal articulation), which is why I included several modified options under the spinal articulation block. She was still able to obtain specific benefits from these exercises, such as hamstring and hip flexor strengthening while keep her spine safe.

The stretches I chose to include in Nancy's program focused on her legs, since she is a frequent hiker and admits to not stretching often enough. A large portion of her program focused on hip flexor and hamstring conditioning and I believe there should be a balance between strengthening and stretching during our sessions.

For Full Body integration, I chose elephant and a modified Scooter (flat back) to focus trunk stabilization and felt they were the safest for Nancy's back for her current level of strength.

Due to a majority of Nancy's program requiring her to be supine, I wanted to incorporate arm exercises that allowed her to sit or stand. She either stood or sat on a large exercise ball for the Magic Circle arm work. As Nancy's strength and experience grow, we will progress to rotating in the Arms Sitting Series.

Full Body Integration – A/M is not currently part of the program.

With her avid passion for hiking, I wanted to support Nancy with exercises that not only help her CES but also assist with her other activities. Since the hiking trails are on un-level ground, often with tree roots and rocks in the pathway, tripping and falling can easily occur. Due to this, working on Nancy's balance was also an essential part of her conditioning program to help prevent falling while out on the
trail. Leg press standing was an excellent exercise for this goal. Not only does it work on balance but also
the hip extensor control we focus on with many of the other exercises in her program. The gluteals
kneeling series also focused on the hip extensor control and adds in some more pelvic lumbar stability.
At this time, I did not add the ankle weights, as to avoid her low back overcompensating for the weight.

I have chosen side lifts and side stretch to use for the lateral flexion block as they provide a safe
option for oblique strengthening and stretching. Lateral rotation was not recommended for Nancy as it
puts too much stress on her spine.

Back Extension was also not recommended for Nancy. However, balance and neuroplasticity are
both great items to work on. So, if we have time at the end of a session, I have Nancy perform swimming
modified. She will stand facing the wall, about 6" away and have her hands about head height. I then
cue her to reach left hand, right leg away from one other (then right hand, left leg) – taking the left hand
up the wall and right foot backward, this challenges not only her trunk stabilization but also her balance
and her brain.

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<thead>
<tr>
<th>Block</th>
<th>Program #1</th>
<th>Program #2</th>
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<tbody>
<tr>
<td>Warm Up</td>
<td>Pelvic curl (modified) – no spinal articulation*; spine twist supine with toes on ground; leg lifts/changes; leg circles (with TheraBand)</td>
<td>Pelvic curl (modified) – no spinal articulation*; spine twist supine with toes on ground; leg lifts/changes; leg circles (with TheraBand)</td>
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<tr>
<td>Footwork</td>
<td>Reformer – parallel heels, parallel toes, V position toes, open V heels, open V toes, calf raises, prances (2 R, B), single leg heel, single leg toe (2 R)</td>
<td>Wunda Chair – parallel heels, parallel toes, V position toes, open V heels, open V toes, calf raises, single leg eel, single leg toe (1-1 &amp; 1-2)</td>
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<td>Abdominals</td>
<td>Short Box Series (modified) – flat back &amp; tilt with an exercise ball between the knees to maintain pelvic floor</td>
<td>Cadillac – bottom lift with roll up bar (modified) – no rolling of the pelvis or articular but lifting pelvis straight up</td>
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<tr>
<td>Category</td>
<td>Exercise Description</td>
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<td>Engagement (all springs)</td>
<td>Reformer – frog, circles (down, up), openings (R&amp;B)</td>
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<td></td>
<td>Cadillac – basic leg springs or single leg supine (Y long springs)</td>
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<tr>
<td>Hip Work</td>
<td>Reformer – frog, circles (down, up), openings (R&amp;B)</td>
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<td>Cadillac – basic leg springs or single leg supine (Y long springs)</td>
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<td>Spinal Articulation*</td>
<td>Bottom lift (modified) – heels on the foot bar, lifting pelvis straight up, no spinal articulation* (2 R, B)</td>
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<td>Wunda Chair - pelvic curl (modified) – (1-2), no spinal articulation* – lifting pelvis straight up</td>
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<td>Reformer - Scooter (modified) – flat back (R)</td>
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<td>Arm Work</td>
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<td></td>
<td>Cadillac - Shoulder adduction single arm (B) &amp; shoulder adduction double arm (R)</td>
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<td>Full Body Integration – A/M</td>
<td>None</td>
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<td>None</td>
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<tr>
<td>Leg Work</td>
<td>Gluteals kneeling series – no ankle weights</td>
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<td>Wunda Chair - leg press standing – client uses a foam roller or pole to assist with balance; hamstring curl; hip opener (1-1)</td>
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<td>Lateral Flexion/Rotation</td>
<td>Side lifts – spine corrector</td>
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<td></td>
<td>Wunda Chair - side stretch (1-2)</td>
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<tr>
<td>Back Extension</td>
<td>Swimming (modified) – slowly executed standing in front of the wall reaching the hand up the wall and the foot away from the wall</td>
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Conclusion

I feel very fortunate to have had the opportunity to work with Nancy and to learn more about Cauda Equina Syndrome and the rehabilitation that follows. As a Pilates instructor, my number one goal will be safety. I will use the knowledge gained from my research on CES to prepare appropriate and safe Pilates programs for other clients with low back issues. Each client should be met with a customized program that is uniquely tailored to his or her individual goals and personal limitations. Our job as instructors is to create a session that speaks to them as an individual. It is up to us to utilize our experience, creativity, and passion as a practitioner to design each of our sessions to be specific for the client's needs. With the use of the Basi Block System, I was able to create a Pilates program for Nancy that focuses on what her body needs to protect her low back, increase her balance, flexibility and strength and challenge her mind.
Bibliography

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“Rehabilitation”. *All Things Spinal*. Author and date are not published